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ORIGINAL ARTICLE

Validation of the Patient Health Questionnaire-9 for Suicide Screening in Transgender Women

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Abstract

Purpose: High prevalence of depression in transgender women highlights the importance of validating the measure to assess depression. Moreover, depression is significantly associated with suicide across research studies. The aims of the current study were to validate a Chinese-language version of the Patient Health Questionnaire-9 (PHQ-9) and to assess operating characteristics of the PHQ-9 for suicide screening in transgender women.

Methods: With the approval of an Institutional Review Board (IRB), a total of 198 transgender women living in Shenyang, China, were recruited, and asked to complete the PHQ-9, including measures of their suicidal ideation, planning and attempt.

Results: A one-factor model of the PHQ-9 was supported in the current sample, showing good reliability and validity. The best cutoff point for the PHQ-9 in suicidal ideation was 17, with a sensitivity/specificity of 77.78%; the best cutoff point for PHQ-9 in suicidal planning was 17, with a sensitivity of 81.82% and a specificity of 73.26%; and the best cutoff point for PHQ-9 in suicidal attempt was 20, with a sensitivity of 75% and a specificity of 90.21%.

Conclusion: Findings supported the validity of the PHQ-9. With potential clinical or research application, the PHQ-9 can be an efficient instrument for suicide screening in transgender women.

Keywords: Patient Health Questionnaire; screening; transgender women; validity

Introduction

Transgender women are such people who were assigned male sex at birth but identify as female.[1] Globally, many transgender people live on the margins of society, where many of them are marginalized from the formal economy into sex work and are seen as paraphilia, demoralization, or deliriums.[2] The 2017 Global Attitudes Toward Transgender People survey, which was conducted in 27 countries around the world, presented in its findings that under a third of global respondents claimed that transgender people were violating their culture and nearly a third of Americans thought that transgender people were committing a sin and so on.[3] In recent years, there has been a growing interest in research on transgender women living in China, particularly due to the increased risk of HIV for such a population.[4]

Nevertheless, with the absence of transgender-related medical resources and official guidelines to instruct transgender-related health care in China, individuals tend to experience mental health problems, compared with the general population, and struggle to access standardized gender-affirming therapies.[5] As a marginalized group, transgender women generally face multiple social stressors, which damage their mental health.[6] Meyer offered the Minority Stress Model to explain that stigma, prejudice, and discrimination create a hostile and stressful social environment that may

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lead to increased mental health problems among lesbian, gay, and bisexual people,[7] which is the most well-developed model available for understanding the impact of stress on the mental health of gender minorities.

Hendricks and Testa extended the Minority Stress Model to transgender populations, and similarly found that social stress and discrimination also are associated with an increased risk for health and mental health problems among transgender people.[8] Research also found that transgender women are more likely to experience discrimination and social exclusion.[6] People with higher levels of discrimination have a greater risk of being diagnosed with moderate or severe depression.[9]

Multiple studies have manifested high psychosocial problems among transgender women, such as depression.[10] Literature reports a depression rate of 35–62% in transgender populations.[11–13] A study by Reisner et al.[14] included 298 transgender women who completed a computer-assisted assessment, in which 35.3% of participants reported a life-time severe depression. The level of depression in transgender people is higher than that in cisgender people whose personal gender identity corresponds to the sex they were assigned at birth. For example, researchers found that 25.25% of transgender women in China exhibited high levels of depression,[15] which is substantially higher than that reported in the general Chinese people (2.06%).[16]

The Patient Health Questionnaire-9 (PHQ-9) can be used not only to assist in the diagnosis of depressive disorders, but also to assess the severity of the disease based on the major disorder of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*.[17] Numerous studies have demonstrated that the PHQ-9 has a good reliability,[18,19] and a cutoff point of ≥ 10 has been recommended for screening depressive episode.[20] For example, the PHQ-9 has not been only used on medical units,[21] but in a wide variety of inpatient and outpatient settings, including in nonmedical care contexts.[22] However, the PHQ-9 has not yet been validated in transgender women in China. Therefore, we aimed to validate a Chinese-language version of the PHQ-9 among transgender women.

Suicidal ideation, attempts, and suicide may be prevalent among transgender population.[23–25] The incidence of suicide is higher in transgender people compared to cisgender people.[26,27] For example, a long-term follow-up study in Sweden found that transgender people were 19-times more likely to experience death from suicide compared to population control.[28] Furthermore, previous studies have found that 18–45% of transgender people have experienced suicidal thoughts during their whole life, with an increasing trend across the life course.[23,29] In addition, a cross-sectional study in China found that transgender women have a high rate of suicidal ideation or attempt (22.0% reported suicidal ideation and 25.6% reported prior suicidal attempt), and the estimated prevalence is greater than that among the general Chinese people where 12–16% experienced suicidal ideation and 2–3% suicidal attempt.[30]

A number of studies have shown that depression is a key factor for suicidal ideation and the final suicidal behaviors.[31,32] Three-dimensional psychological pain model in suicide suggests that pain avoidance during depression would be a strong motivation of suicidal ideation and suicidal behaviors.[33] Orbitofrontal cortex and its abnormal activation patterns with prefrontal and subcortical structures (anterior cingulate gyrus, amygdala, hypothalamus, etc.) may be an important neural basis for the high avoidance motivation triggered by painful experiences and consequently suicidal behaviors.[34] Therefore, we aimed to screen suicide by assessing depression of transgender women.

Based on a wealth of studies validating the PHQ-9 in other settings, the purpose of the present research was (1) to validate a Chinese-language version of the PHQ-9 and (2) to assess the operating characteristics of the PHQ-9 for suicide-screening in transgender women.

Methods

Participants

Following ethical approval from the Public Health and Nursing Ethics Committee of Shanghai Jiao Tong University School of Medicine, this study was conducted with 198 transgender women from Shenyang, Liaoning, China from April 2017 to July 2017, who were at an age between 18 and 62 years (mean = 33.47, standard deviation = 9.59). All participants signed the informed consent form and completed a questionnaire package.

Measures

Depression was assessed with the Chinese PHQ-9.[18,20] This scale includes 9 items, evaluated on a four-point Likert-type scale (0 = not at all, 3 = almost every day) with higher total scores indicating higher degree of depressive symptoms. The PHQ-9 has great validity and reliability in many studies.[18,20]

Suicidal ideation was assessed with an item "Have you considered suicide in the past year?"; suicidal planning was assessed with an item "Have you planned to complete suicide in the past year?"; and suicidal attempt was assessed with an item "Have you completed (or almost completed) suicide in the past year?." Answer with yes or no (yes = 1, no = 0).

Procedure

Snowball sampling was used for recruitment because transgender women in China are hard to reach and hidden due to the universal discrimination.[35,36] The inclusion criteria were as follows: (1) older than 18 years; (2) male sex assigned at birth; (3) self-identification as female; and (4) agreeing to participate in the study and being willing to provide written informed consent. With the assistance of a nongovernmental organization who is dedicated to improving the physiological and psychological health of transgender women, five eligible transgender women were recruited as the "seeds." Then these "seeds" each recruited or referred other suitable participants, thus, aggregating the snowball until saturation reached.

After giving their consent, participants could complete the survey. A total of 198 transgender women were consented to participate in the study. Of those individuals who remained in the analytic sample, 20 self-reported being heterosexual (10.1%), 138 self-reported being homosexual (69.7%), 32 self-reported being bisexual (16.2%), 1 self-reported being pansexual (0.5%), and the rest reported being unsure about sexual orientation (3.5%).

Results

Descriptive statistics and internal consistency

As shown in Table 1, skewness and kurtosis indices revealed that the depression was normally distributed; Cronbach's alpha and Omega internal consistency coefficients were high for the PHQ-9 total scale ($\alpha = 0.895$; $\Omega = 0.898$).

Table 1. Descriptive Statistics and Internal Consistency Coefficients for the Patient Health Questionnaire-9 ($n = 198$)

Scale	*M* (SD)	SK (SE)	*K* (SE)	α	Ω
PHQ-9	15.56 (5.70)	1.25 (0.17)	1.86 (0.34)	0.895	0.898

α, Cronbach's index of internal consistency; Ω, omega internal consistency coefficient; *K*, kurtosis; *M*, mean; PHQ-9, Patient Health Questionnaire-9; SD, standard deviation; SE, standard error; SK, skewness.

Structural validity

First, an exploratory factor analysis (EFA) was conducted with SPSS version 26.0, with varimax rotation on the 9 items. The Kaiser-Meyer-Olkin value was 0.914, and the Bartlett's test of Sphericity was statistically significant ($\chi^2 = 837.29$, $p < 0.001$), indicating the adequacy of proceeding with factor analysis. The EFA yielded a one-factor solution that accounted for 55.119% of the variance, and item loadings ranged from 0.648 to 0.832 (Table 2).

Then a confirmatory factor analysis was conducted with AMOS version 24.0, with maximum likelihood estimation (all nine items showed to be normally distributed: skewness range = 0.336–1.592; kurtosis range = −1.297 to 1.270). Missing data at the item level were estimated using full information maximum likelihood. For simple models such as the PHQ-9, comparative fit index (CFI) and incremental fit index (IFI) values of 0.95 or higher, root mean square error of approximation (RMSEA) values of 0.08 or lower, and standardized root mean square residual (SRMR) values of 0.08 and lower are considered acceptable. The model could reach a satisfactory fit to the data ($\chi^2/df = 2.288$, CFI = 0.957, IFI = 0.958, RMSEA = 0.081, SRMR = 0.0425). Therefore, the 9-item one-factor structure was retained as the final model.

Operating characteristics of the PHQ-9 and suicide

According to Murphy,[37] receiver operating characteristic (ROC) analysis provides a more comprehensive assessment of a psychiatric diagnostic or screening tool by providing a full set of possible sensitivity and specificity indicators as opposed to a single

Table 2. Exploratory Factor Analysis of Item Loadings for the Patient Health Questionnaire-9

Item	Loading
1. Little interest or pleasure in doing things	0.747
2. Feeling down, depressed, or hopeless	0.832
3. Trouble falling asleep, staying asleep, or sleeping too much	0.658
4. Feeling tired or having little energy	0.804
5. Poor appetite or overeating	0.648
6. Feeling bad about yourself or that you're a failure or have let yourself or your family down	0.739
7. Trouble concentrating on things, such as reading the newspaper or watching television	0.746
8. Moving or speaking so slowly that other people could have noticed. Or, the opposite-being so fidgety or restless that you have been moving a lot more than usual	0.796
9. Thoughts that you would be better off dead, or of hurting yourself in some way	0.690

assessment such as predictive value, sensitivity, and specificity. The ROC analysis was shown in Figure 1, which revealed that the PHQ-9 had a strong ability to discriminate the individuals as suicidal ideation and nonsuicidal ideation (area under the ROC curve [AUC] = 0.837, [0.778, 0.885], $p < 0.001$), suicidal planning and nonsuicidal planning (AUC = 0.828, [0.768, 0.878], $p < 0.001$), and suicidal attempt and nonsuicidal attempt (AUC = 0.848, [0.790, 0.895], $p < 0.001$). The difference did not achieve statistical significance ($p > 0.05$).

With the maximum Youden index (sensitivity + specificity = 1), the best cutoff point for PHQ-9 in suicidal ideation was 17, with a sensitivity/specificity of 77.78%; the best cutoff point for the PHQ-9 in suicidal planning was 17, with a sensitivity of 81.82% and a specificity of 73.26%; and the best cutoff point for the PHQ-9 in suicidal attempt was 20, with a sensitivity of 75% and a specificity of 90.21%.

The relationships between depression and suicide

A one-way logistic regression analysis of depressive symptoms with suicidal ideation, planning, and attempt, respectively, using a forward stepwise regression method based on maximum likelihood estimation, showed that depressive symptoms were a risk factor for suicide (Table 3).

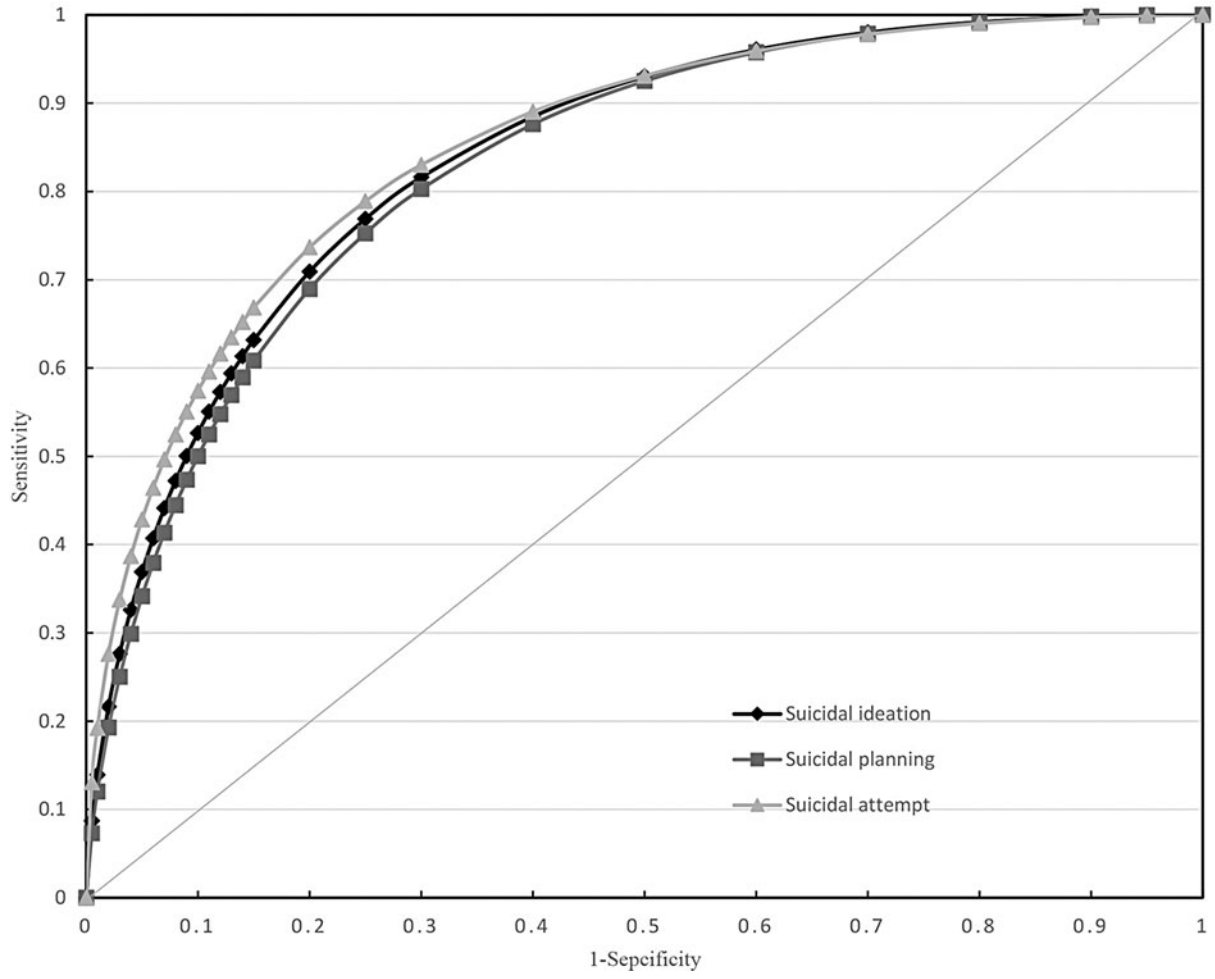

FIG. 1. Fitted ROC curves for pairwise discriminations among suicidal ideation, planning, and attempt. The diagonal denotes the random classification level where AUC = 0.5. AUC, area under the ROC curve; ROC, receiver operating characteristic.

Table 3. The Logistic Regression of Suicidal Ideation, Planning, and Attempt with Transgender Women

Variable	*B*	SE	Wald χ^2	*p*	OR	95% CI
Depression 1	0.290	0.056	26.81	0.000	1.34	1.20–1.49
Depression 2	0.267	0.073	13.26	0.000	1.31	1.13–1.51
Depression 3	0.294	0.118	6.145	0.013	1.34	1.06–1.69

CI, confidence interval; OR, odds ratio.

Discussion

The population assessed in this study was transgender women, and the results may be informative for the use of the PHQ-9 on this population. The direction of the assessment focused more on the scale's cutoffs for suicide with different severity.

In line with the first objective, our results showed that this Chinese-language version of the PHQ-9 showed good reliability and validity among transgender women, which were similar to the findings among college students,[38] older adults,[39] and clinical patients,[20] suggesting that it is appropriate for the assessment of the depression among gender minority individuals. The retest reliability of the PHQ-9 was not assessed in this study. Retest reliability is important for psychometric assessments and is generally chosen at least 1 week to eliminate memory effects. For the PHQ-9, the past 2 weeks are required to assess depressive episodes. However, given that transgender populations are difficult to recruit and retain in research, it was difficult for us to conduct follow-up studies.

Regarding the second objective, the screening properties of the PHQ-9 in suicide were supported by excellent AUC values. The cutoff points are 17, 17, and 20 for suicidal ideation, planning, and attempt, respectively, which are greatly different from previous studies. Most studies found that the best cutoff point is 10, and this part of patients always need psychological intervention by psychologists.[20,40,41] Some studies have shown that different populations can have different cutoff points. For example, in the validation of patients with mental illness, when the cutoff point was ≥ 10, it produced a high sensitivity of 0.93, while its specificity was low at 0.53, and when the cutoff point was adjusted to ≥ 13, it produced a better specificity and sensitivity, 0.83 and 0.72, respectively. Consequently, the optimal cutoff point is recommended to be ≥ 13 or higher.[42]

The differences between this study and previous studies may be related to factors such as the origin, cultural background, and composition of the participants. In the present research, logistic regression analysis further revealed that depressive symptoms were a risk factor for suicide. Transgender women may suffer from minority stress associated with discrimination, internalized transphobia, and tend to get depressed, which directly increases the risk of suicide.

In this study, we hope to find a simpler, more convenient, and more efficient scale that psychotherapist can use to evaluate the psychological state of transgender women and to timely identify transgender women with depression, and the results show the best cutoff point for suicide screening. Second, the present study provided a first validation of a Chinese-language version of the PHQ-9 in gender minority individuals. Third, the findings from the current study were cross-sectional, and future work, longitudinal study may be useful for better understanding of how this construct evolves over time. Finally, samples of this study were sufficient to demonstrate the association between depression and suicide, although they were not many in numbers.

In summary, these findings have some implications. From an operational and clinical risk management standpoint, the PHQ-9 can be used for screening before a primary care visit, a mental health, or in other settings. A primary care clinician, mental health clinician, or general practice should pay attention to the association between depression and suicide; as a screener, the PHQ-9 also required a higher cutoff than previously recommended in transgender women. However, the PHQ-9 is a general screening tool but not a substitute for a thoughtful psychiatric evaluation and suicide risk assessment by a trained clinician. Besides, it is important to have organization, and local or national policies that are protective and affirming of transgender and gender diverse people to reduce the adverse impact of gender minority stress. Clinical practices also need to plan and implement inclusive and affirming health care environments for transgender and gender diverse people.[43]

There were several limitations as well in the present study. First, participants were recruited mainly through snowball sampling in Shenyang, which means that the applicability of the findings to other areas in China may be limited. Future research covering the diversity of transgender women across China is needed. Second, the sample in this study was restricted to transgender woman, another future research direction may be to test this measure with transgender men and gender nonbinary/gender nonconforming individuals.

Conclusion

The current study is the first to validate the PHQ-9 in a Chinese transgender women sample. The PHQ-9 performed well as a measure of depression and a screener for suicide with different severity using a higher cutoff than the recommendation in primary care settings. It is suggested in future studies to focus on the interventions for this populations and replicate the one-factor structure in other sexual minority samples.

Authors' Contributions

All authors contributed to the whole process of the research. L.X. and R.C. analyzed the data and wrote the article. H.W., C.X., X.Y., H.C., R.W., S.L., and Y.L. participated in the experimental design and data collection. Y.W. and Y.C. gave guidance on the experimental design and article writing.

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Author Disclosure Statement

No competing financial interests exist.

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Abbreviations Used

α = Cronbach's index of internal consistency
Ω = omega internal consistency coefficient
AUC = area under the ROC curve
CFI = comparative fit index
CI = confidence interval
EFA = exploratory factor analysis
IFI = incremental fit index
K = kurtosis
M = mean
OR = odds ratio
PHQ-9 = Patient Health Questionnaire-9
RMSEA = root mean square error of approximation
ROC = receiver operating characteristic
SD = standard deviation
SE = standard error
SK = skewness
SRMR = standardized root mean square residual